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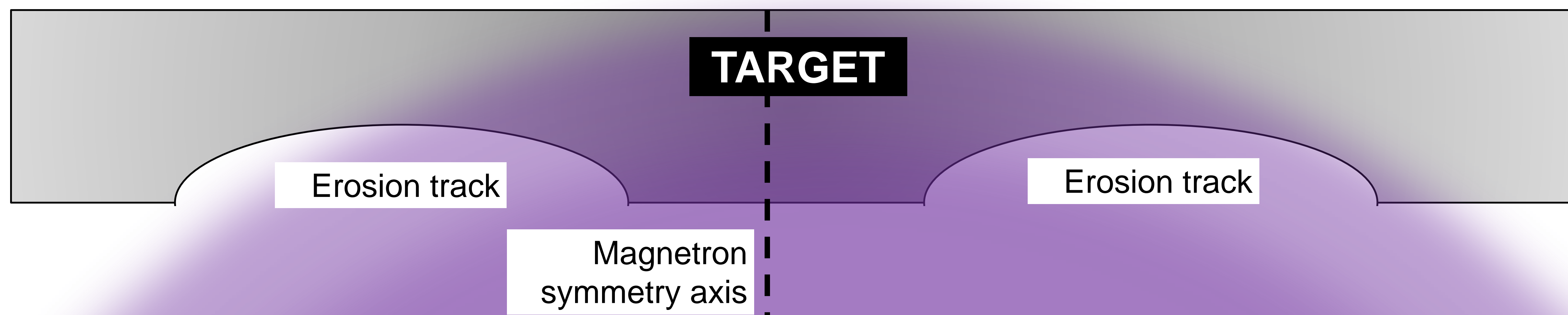
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Depth-dependent composition of sputtered ZnO:Al

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The film

- ZnO with 2% Al from ceramic target
- RF sputtering at 150°C on **Si substrate**
- **Low pressure** regime (2.5 mTorr – 5 mTorr) where ion bombardment has a strong spatial dependence

The analysis technique

- X-ray photoemission spectroscopy (**XPS**)
- Depth profile by ion beam sputtering at 500 eV and elemental quantification

Conclusion

- **Al- O- rich phases** at back interface are observed at positions far away from the magnetron axis
- **Al- O- rich phases** occur for deposition pressures up to 5 mTorr, in the positions with state-of-the-art resistivity [1]
- Avoiding **Al- O- rich phases** may further decrease record resistivity [2]

[1] A. Crovetto et al., Performance limitations and property correlations of Al-doped ZnO deposited by RF sputtering, *J. Phys. D: Appl. Phys.* **49** (2016) 295101

[2] A. Bikowski, K. Ellmer, Inhomogeneous aluminium dopant distribution in magnetron sputtered ZnO:Al thin films and its influence on their electrical properties, *APL Mater.* **3** (2015) 060701

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